



Current Issues in Emergency Management (CIEM) Sessions 1 & 2  
October 12<sup>th</sup> and 26<sup>th</sup>, 2006  
Florida Division of Emergency Management  
Tallahassee, Florida



# El Niño Update Impacts on Florida

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Melbourne, FL

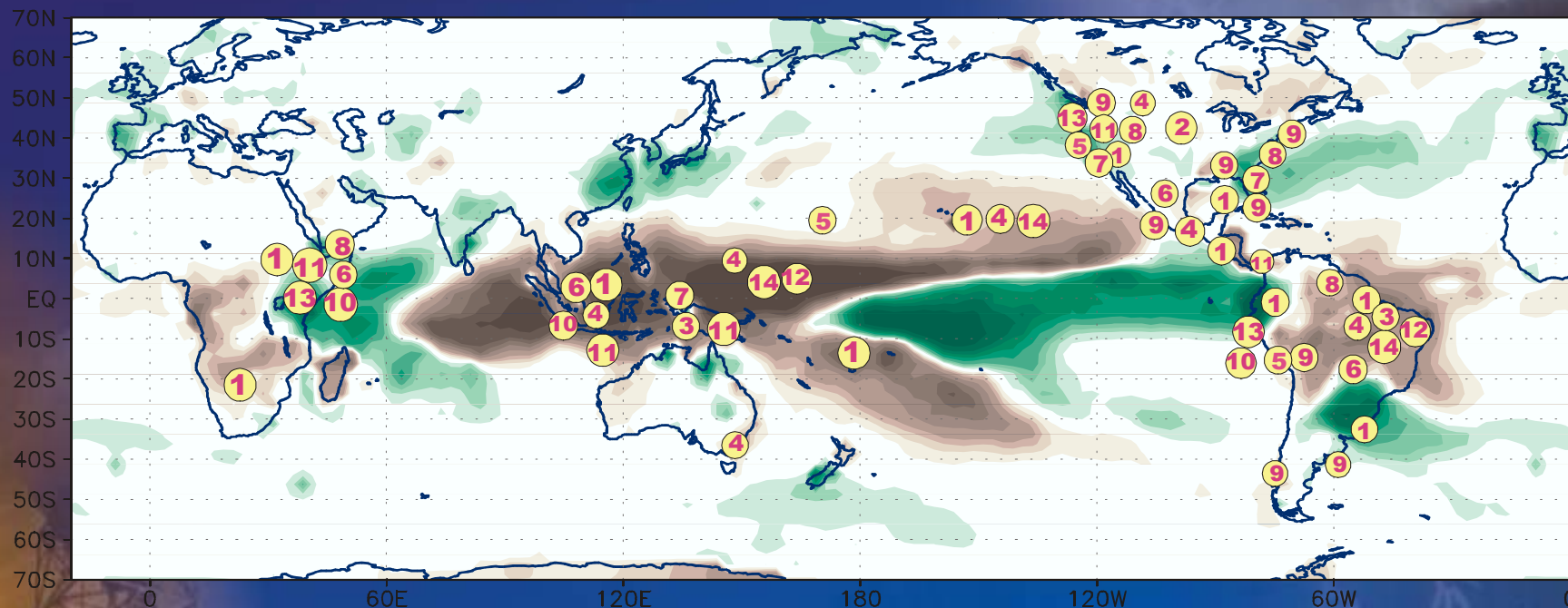
# What is El Niño?

- Large-scale ocean-atmosphere climate phenomenon linked to a periodic warming in sea surface temperatures (SSTs) across the central and east-central equatorial Pacific
- Naturally occurring phenomenon
- Major shifts occur in the patterns of tropical precipitation, pressure (Southern Oscillation) and winds (Jet Stream)

# Global Impacts Related to 1997-98 El Niño



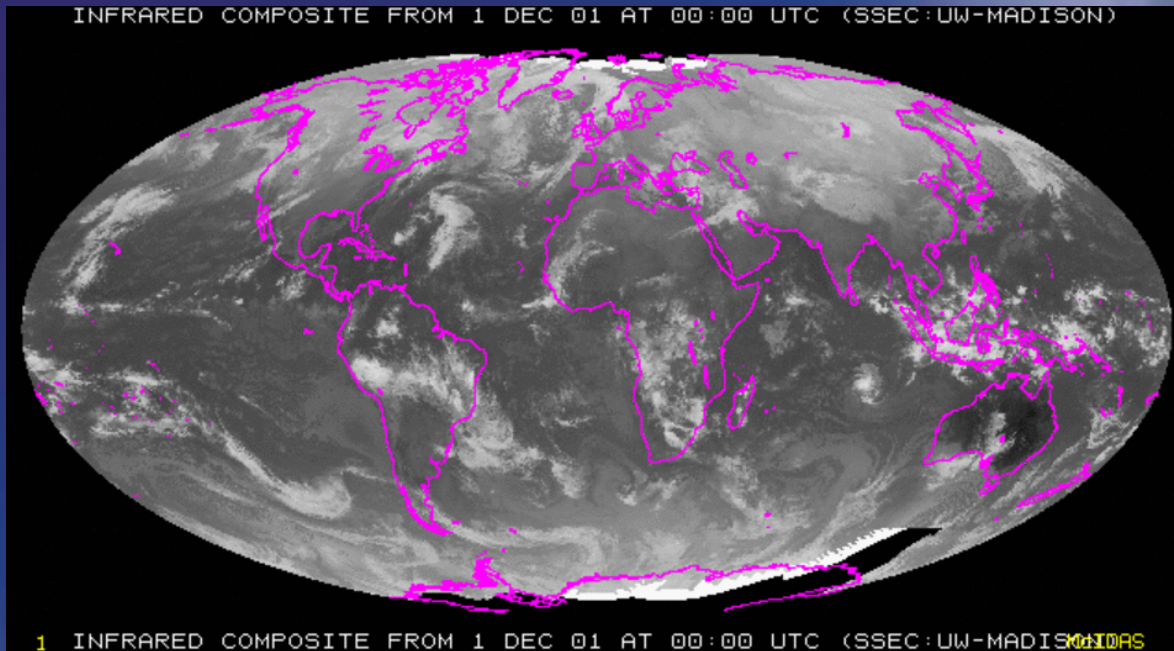
## Impacts from 1997/98 El Niño



- |                         |                             |
|-------------------------|-----------------------------|
| 1. Crop/Stock Damage    | 8. Pests Increased          |
| 2. Energy Savings       | 9. Property Damage          |
| 3. Famine               | 10. Tourism Decreased       |
| 4. Fires                | 11. Transportation Problems |
| 5. Fisheries Disruption | 12. Social Disruptions      |
| 6. Health Risks         | 13. Wildlife Fatalities     |
| 7. Human Fatalities     | 14. Water Rationing         |



# Why do we have El Niño?

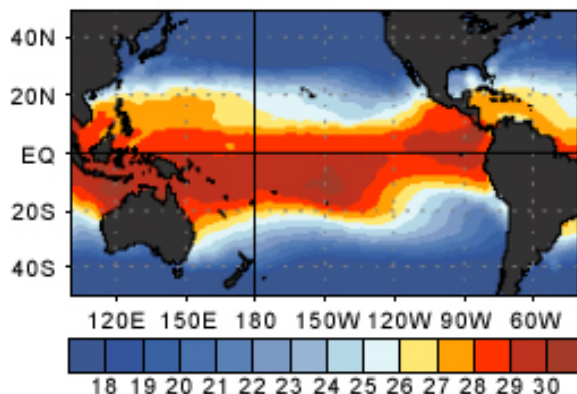


- Necessary mechanism for maintaining long-term climate stability
- Acts to more effectively transport heat from the Tropics to higher latitudes via atmospheric circulation

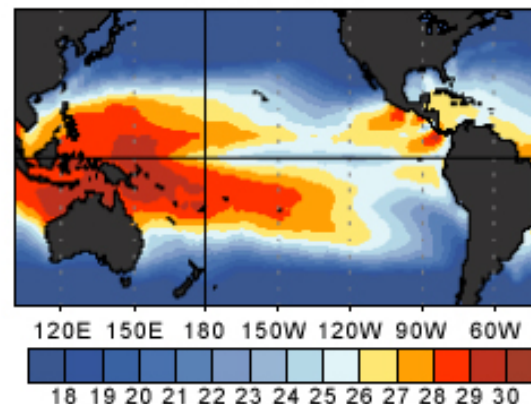
# The ENSO Cycle

## El Niño vs. La Niña

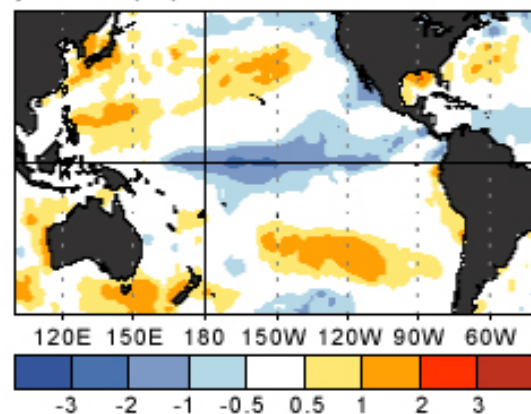
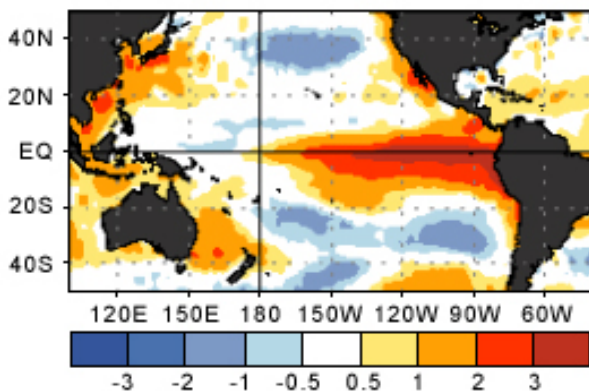
**El Niño Conditions  
Jan-Mar 1998**



**La Niña Conditions  
Jan-Mar 1989**



Ocean Temperature Departures (°C)



NOAA/NCEP/CPC

# Effect of El Niño

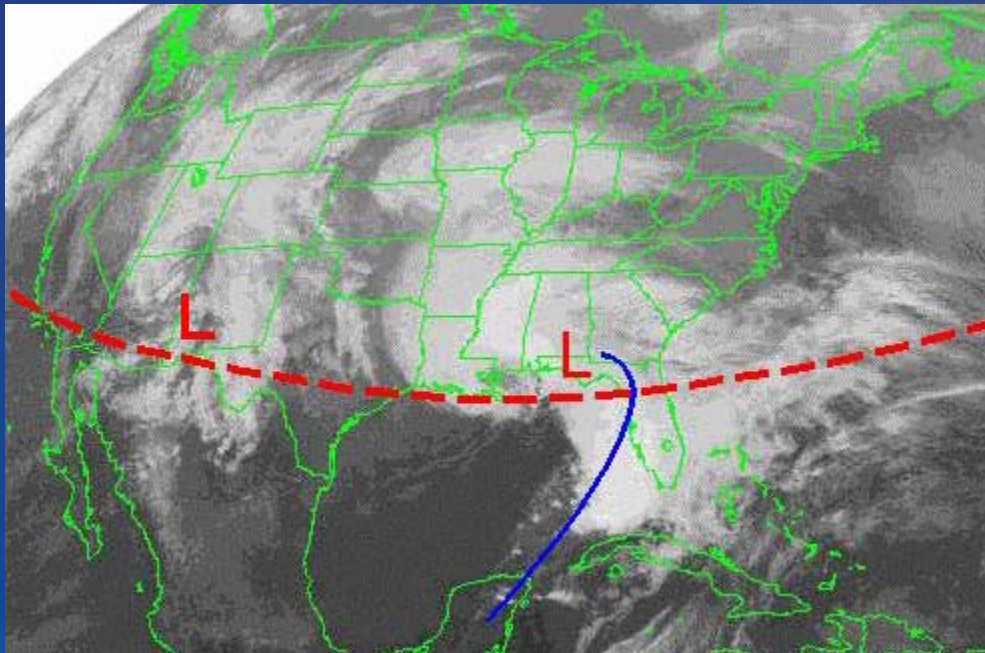
- Convection tends to be longer lived over SSTs of  $28^{\circ}\text{C}$  or greater
- Shift in warm SSTs eastward will have a dramatic effect on where convection will be longer lived
- Adjusts location of the jet stream



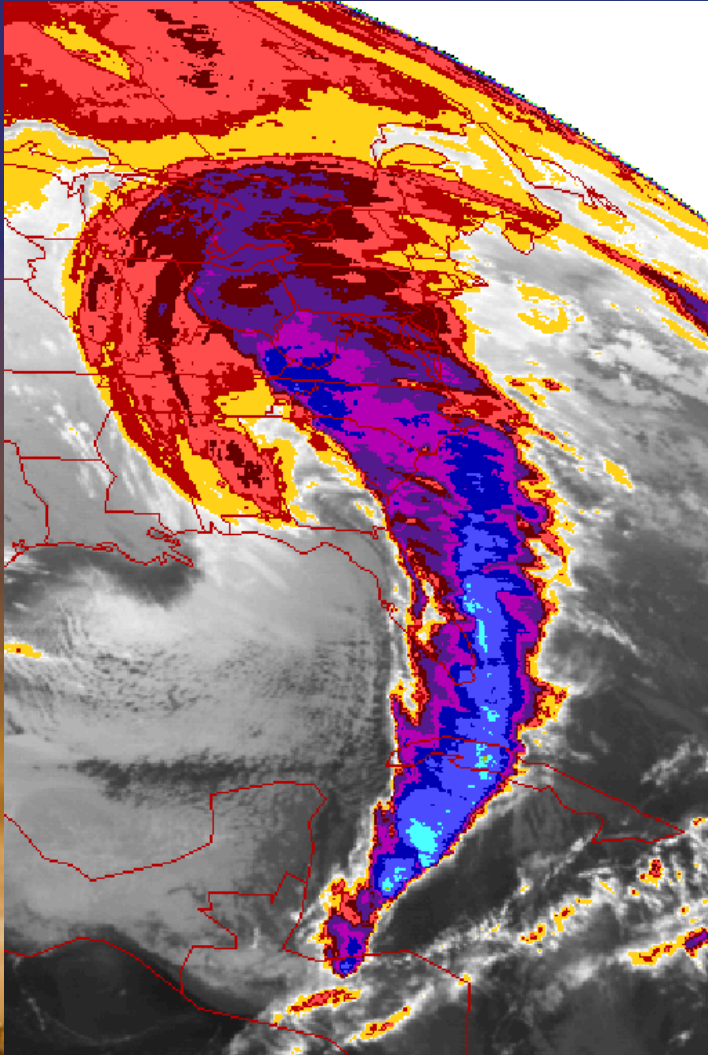


# Why should you care?

- El Niño is the strongest predictor of dry season storminess across Florida
- Extratropical storms can sometimes have as great an impact as tropical systems



# Impacts of Extratropical Storms

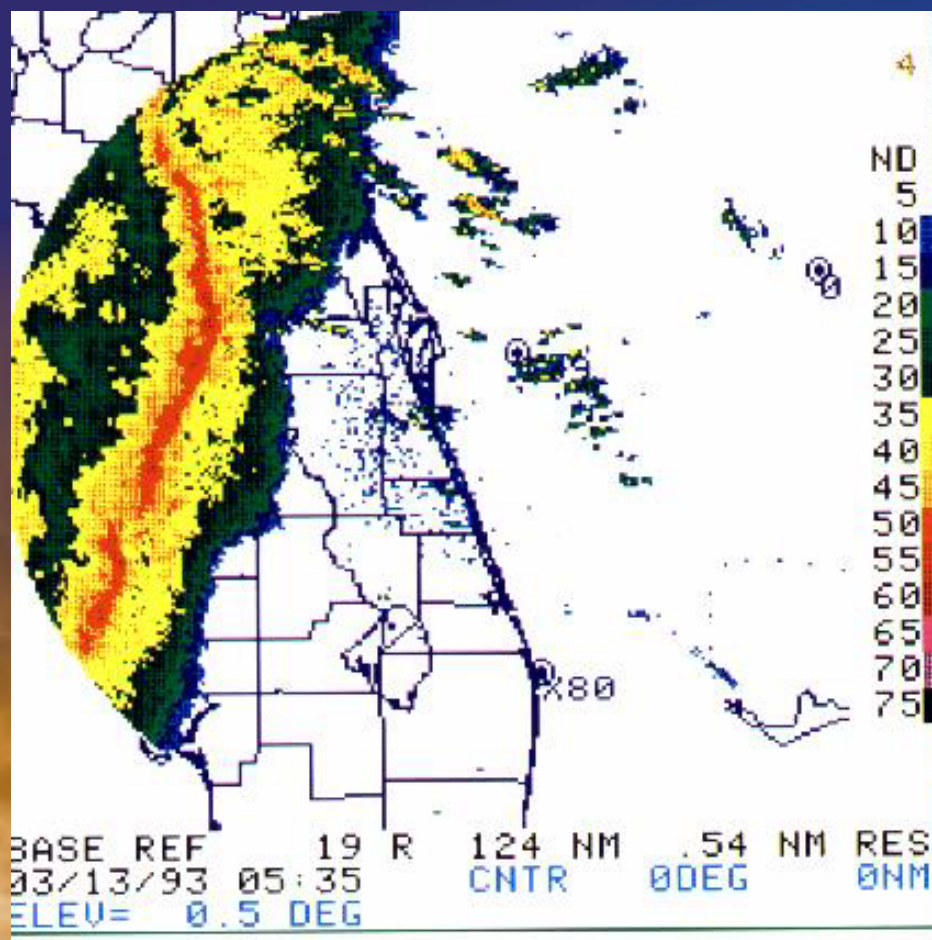


## Storm of the Century – March '93

- Snow/Cold
  - Trace - 4 inches Northern FL
  - 3 inches in Tallahassee
  - Sub-freezing Temperatures
- Wind
  - 8 to 12 hrs of sustained up to 50 mph
  - Gusts up to 70 mph
  - Over 100 mph reported on the Dry Tortugas
- Storm Surge
  - 5-9 ft along Gulf Coast to Keys
  - 9-12 ft in Taylor County
  - Severe Beach Erosion



# Storm of the Century - 1993

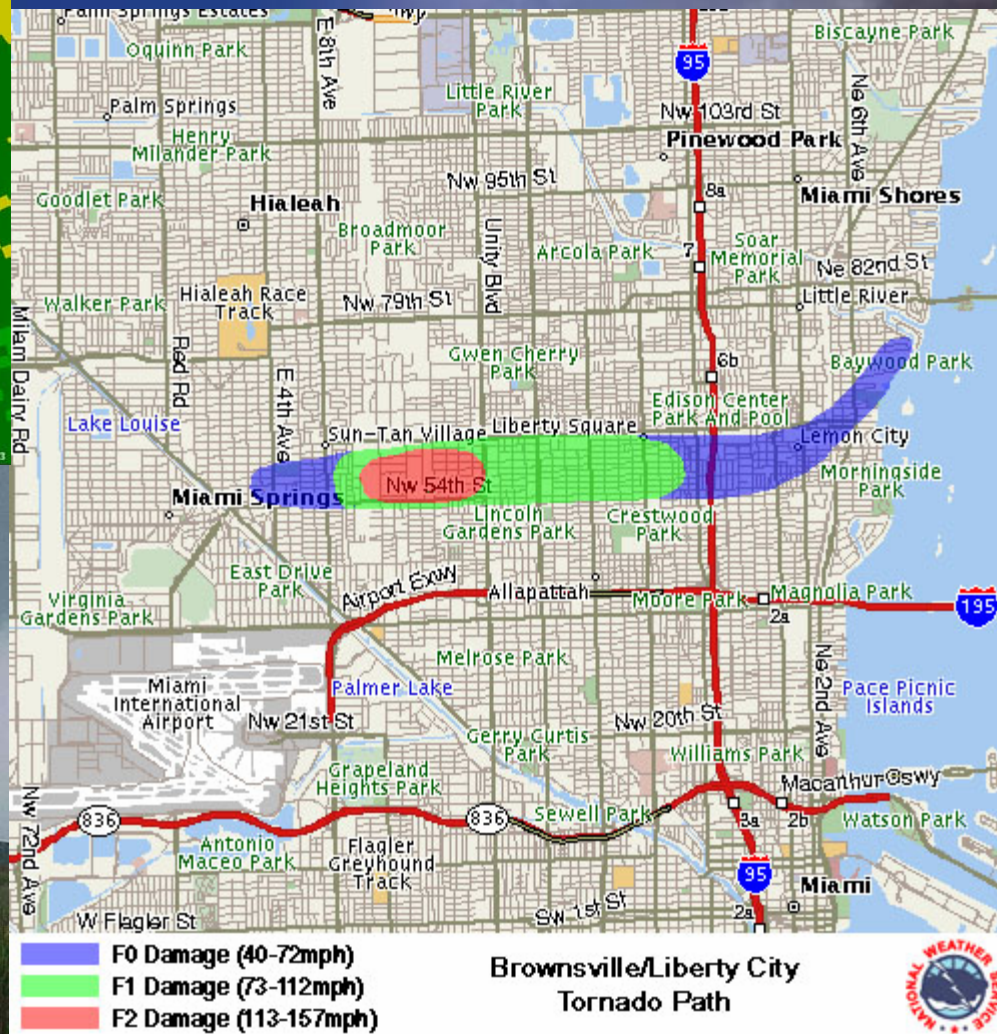
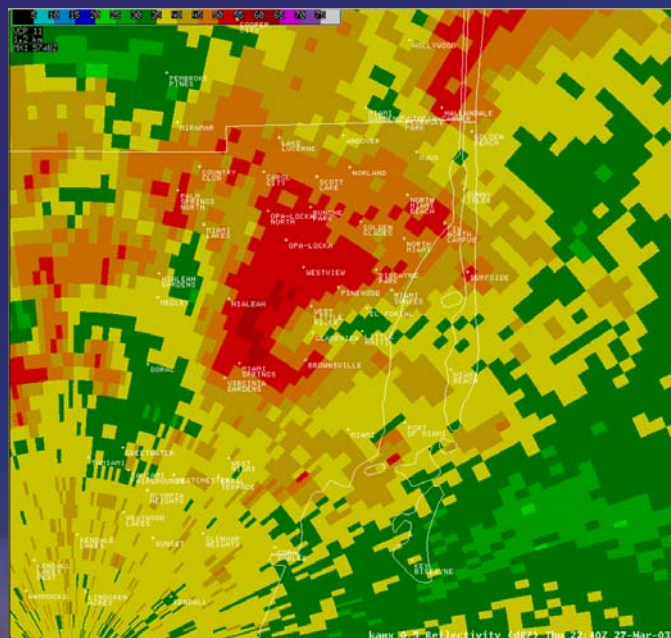


- Squall Line
  - Destructive Thunderstorms
  - Strong Downbursts
  - Tornadoes, Derechos
- Fatalities
  - 47 total
- Property Damage
  - Estimated at \$1.6 billion



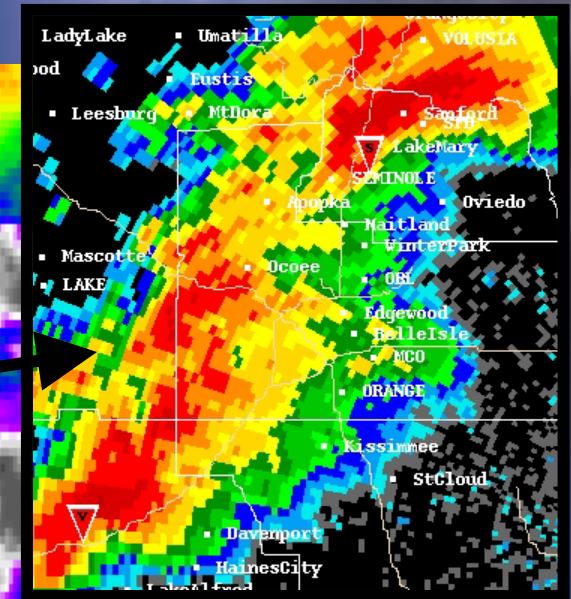
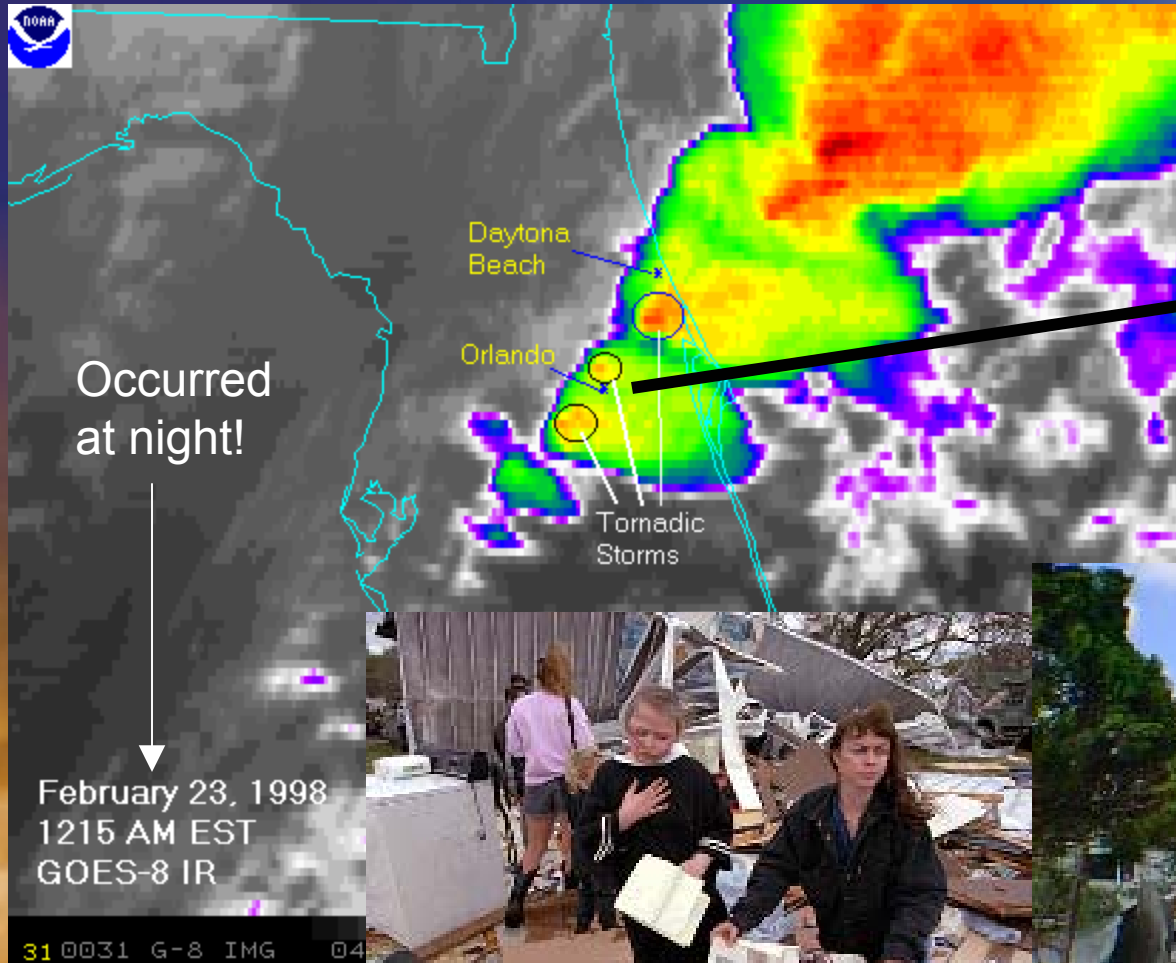
# Last Non-Hurricane Related Tornado Death

- March 27<sup>th</sup> 2003
- Weak to Moderate El Niño



# Worst Tornado Outbreak in FL History

- 42 killed
- One of the strongest El Niños on record





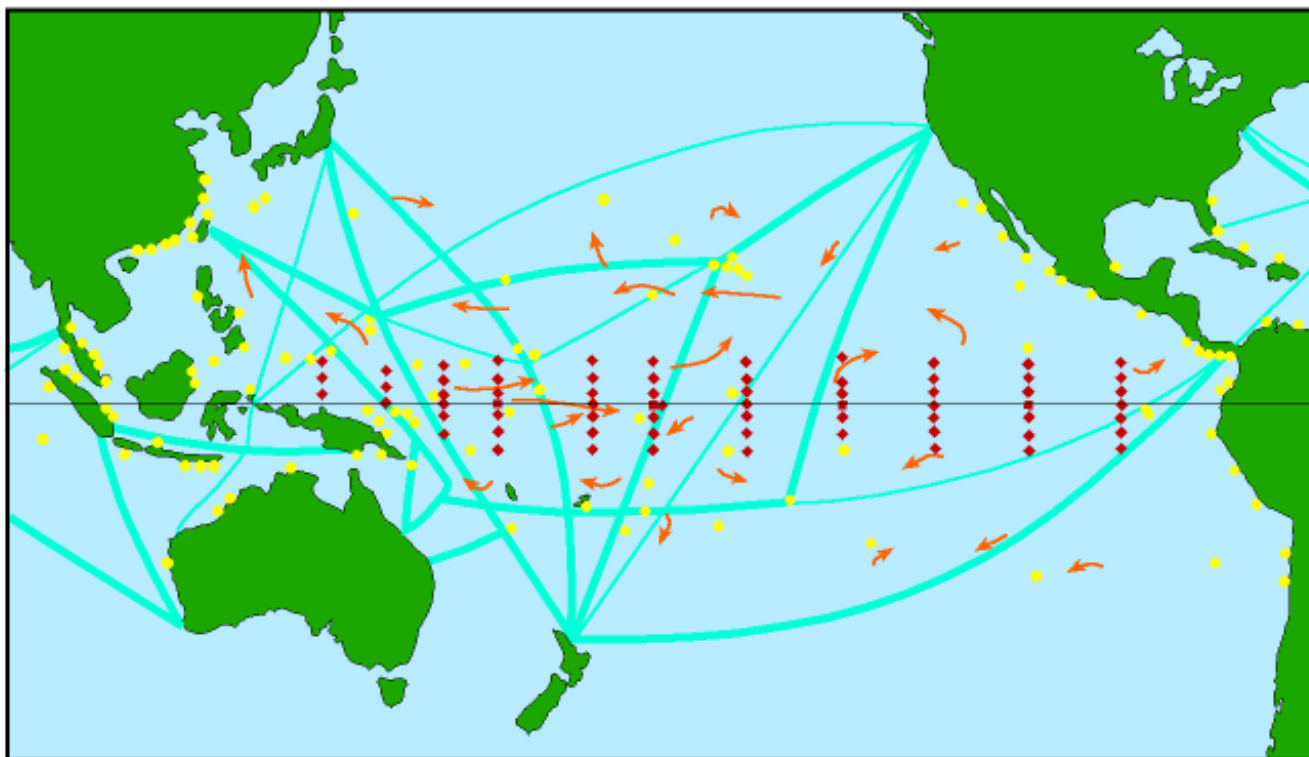
# Important Reminder For Severe Weather Season

- Fact: Most tornado deaths in the winter and spring occur after dark – often late at night
- NOAA Weather Radios have been widely adopted since 1998
- They need to be programmed and used!

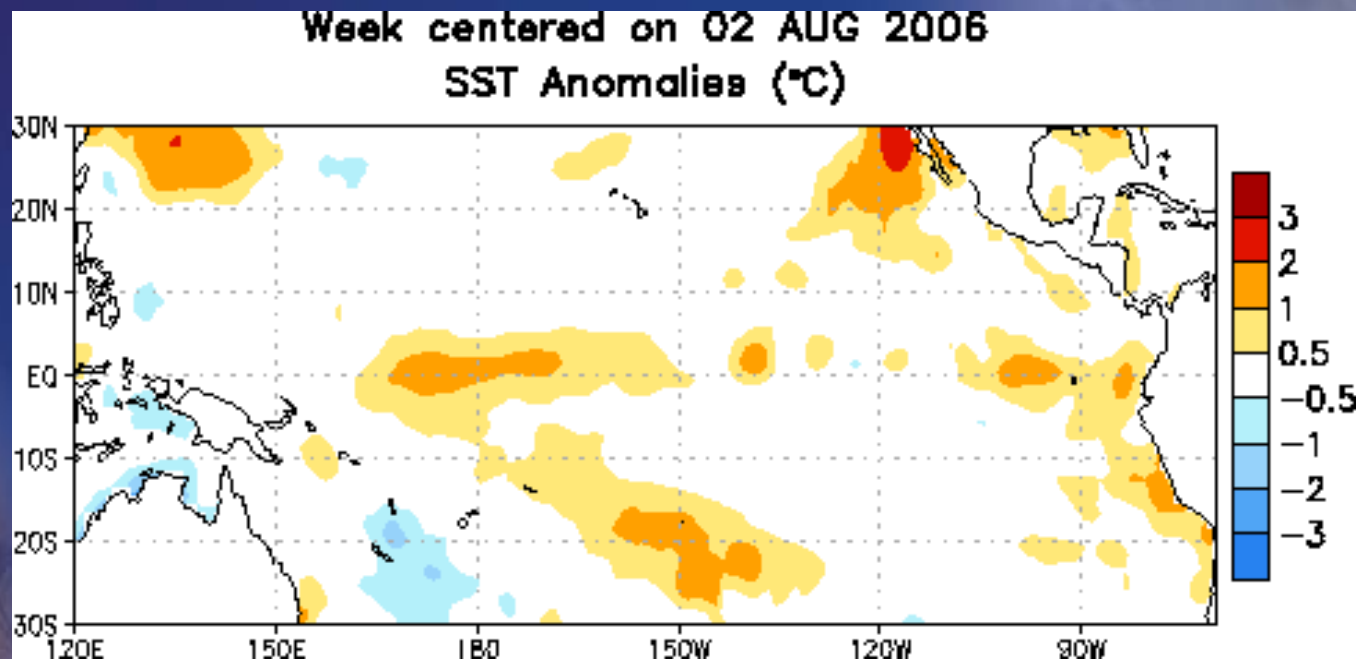


# El Niño and La Niña Don't Arrive Without Warning Anymore!

## ENSO Observing System



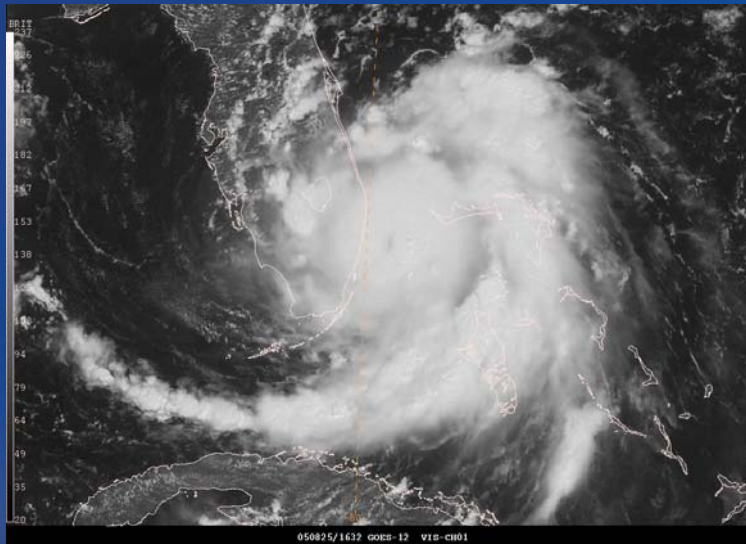
# Latest Pacific SSTs





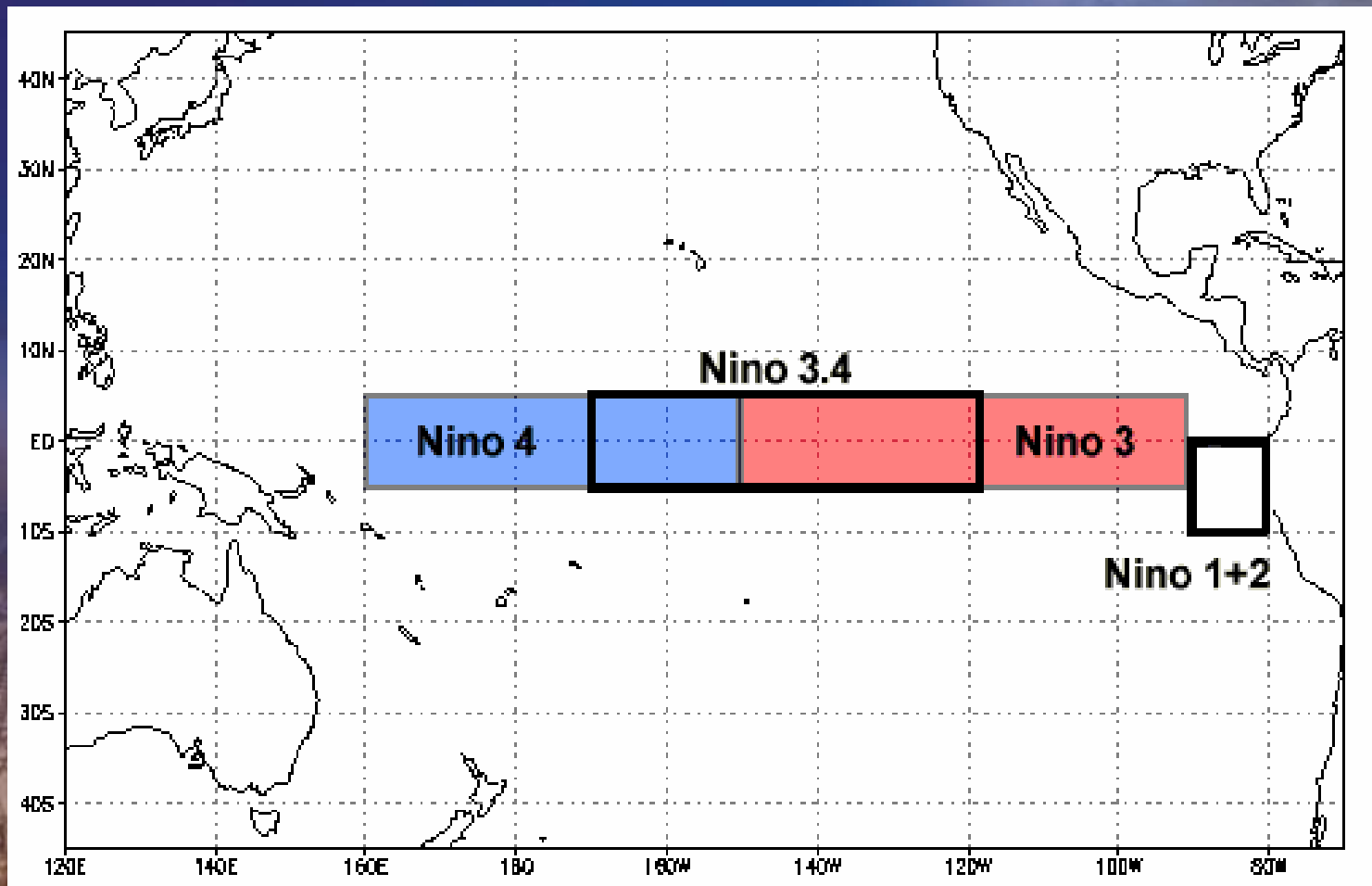
# Effects in the Tropical Atlantic

- Development of weak El Niño conditions helps explain why this Atlantic hurricane season has been less active
- El Niño typically acts to suppress hurricane activity by increasing vertical wind shear



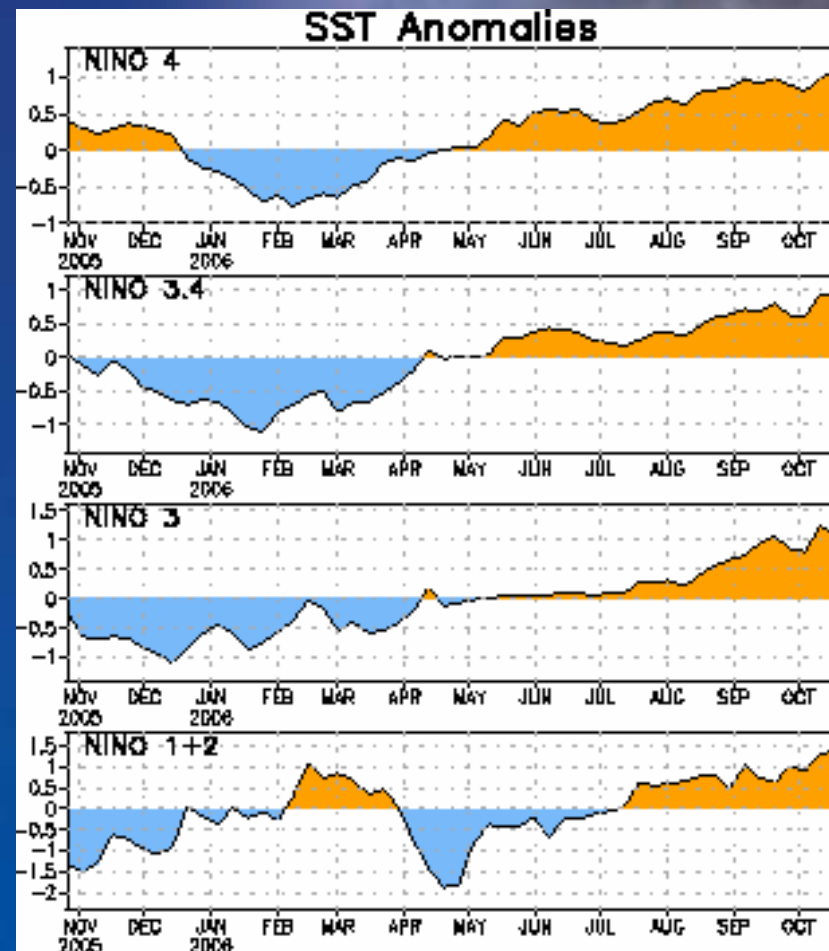
Katrina approaching  
Southern FL (2005)

# Niño Regions



# Latest Niño Indices

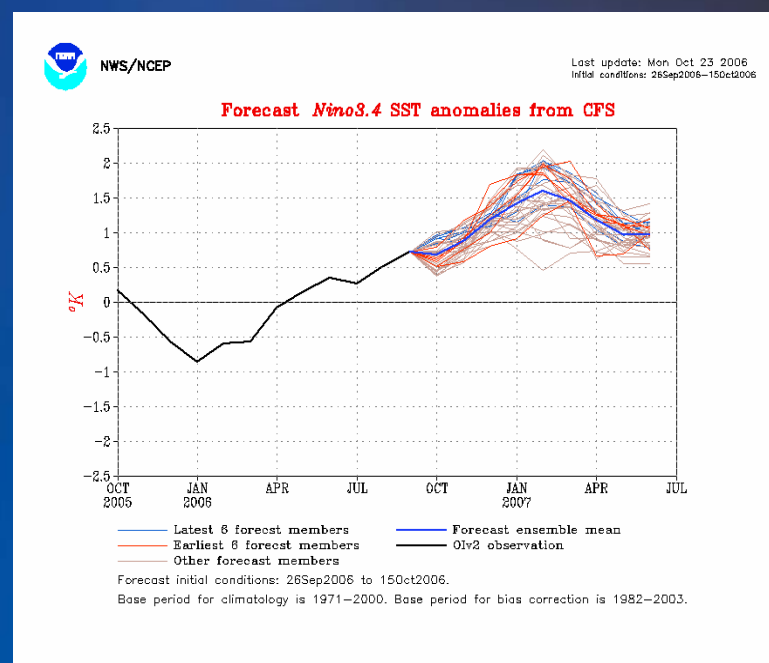
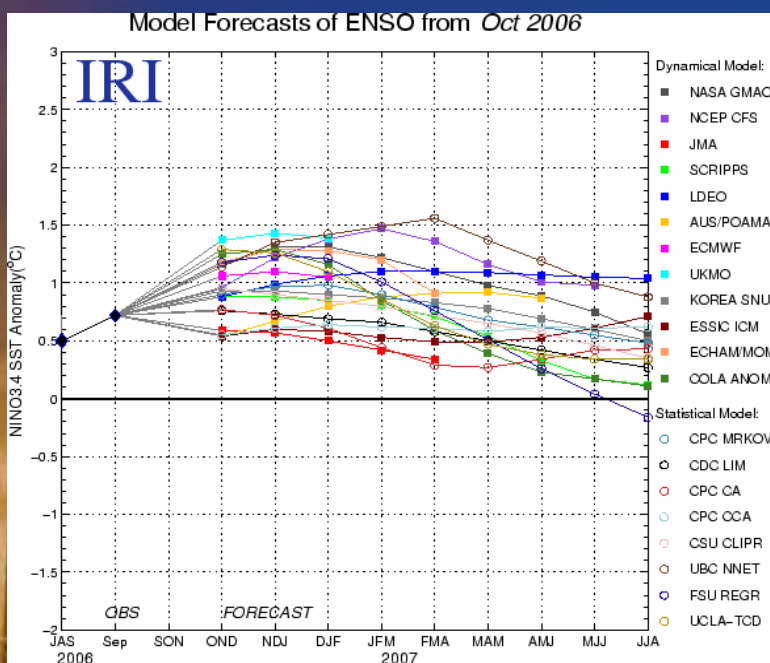
- El Niño conditions defined as anomalies of  $0.5^{\circ}\text{C}$  in Niño 3.4 region





# How do we forecast El Niño?

- Using dynamical (CFS, ECMWF) and statistical models
- Model Ensembles of the CFS



# CFS Forecast Anomalies

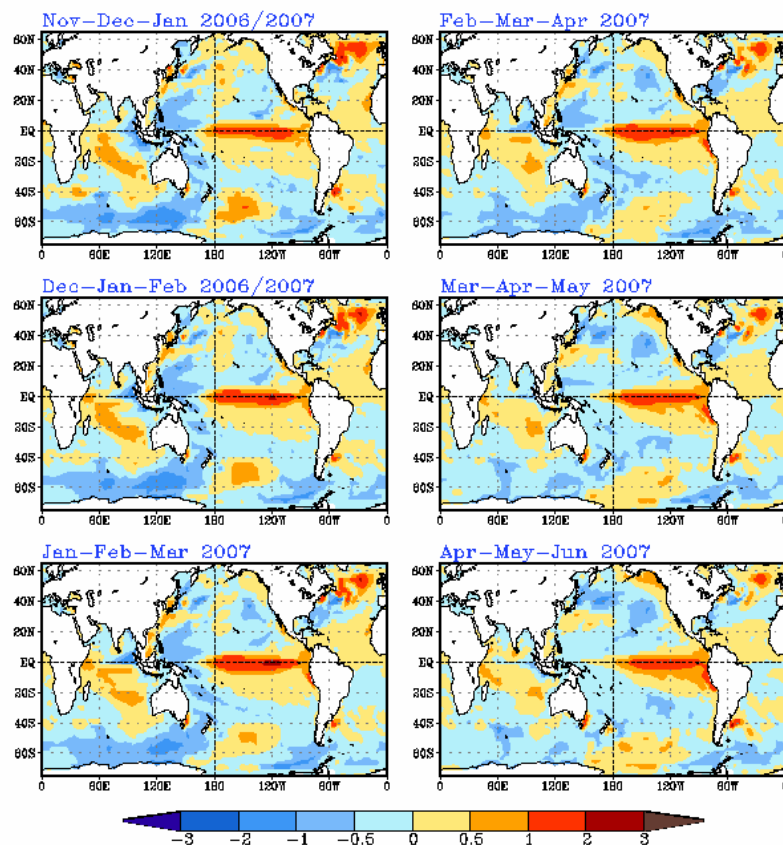


NWS/NCEP

Last update: Mon Oct 23 2006

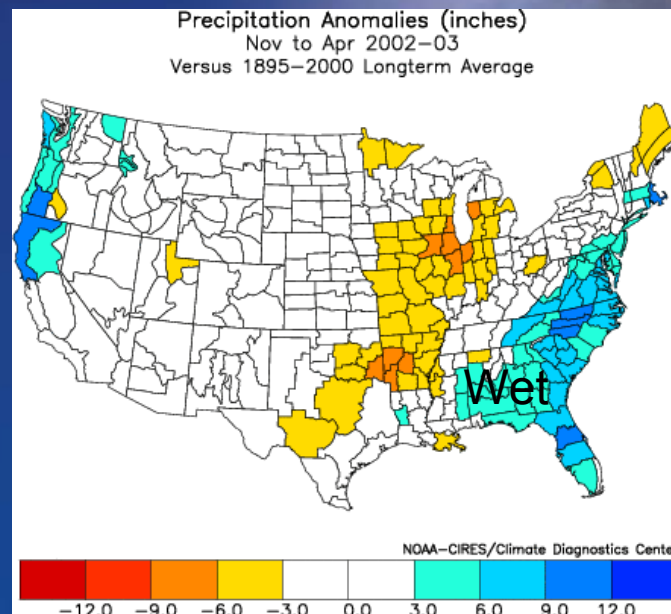
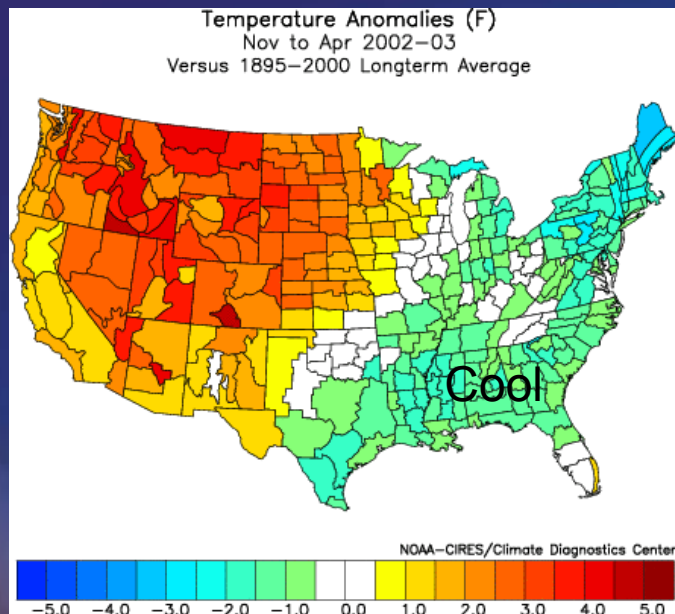
Initial conditions: 26Sep2006–15Oct2006

## CFS seasonal SST forecast (K)



Ensemble average of 40 members from initial conditions of 26Sep2006 to 15Oct2006.  
Base period for climatology is 1982–2003. Base period for bias correction is 1982–2003.

# What happened last El Niño?

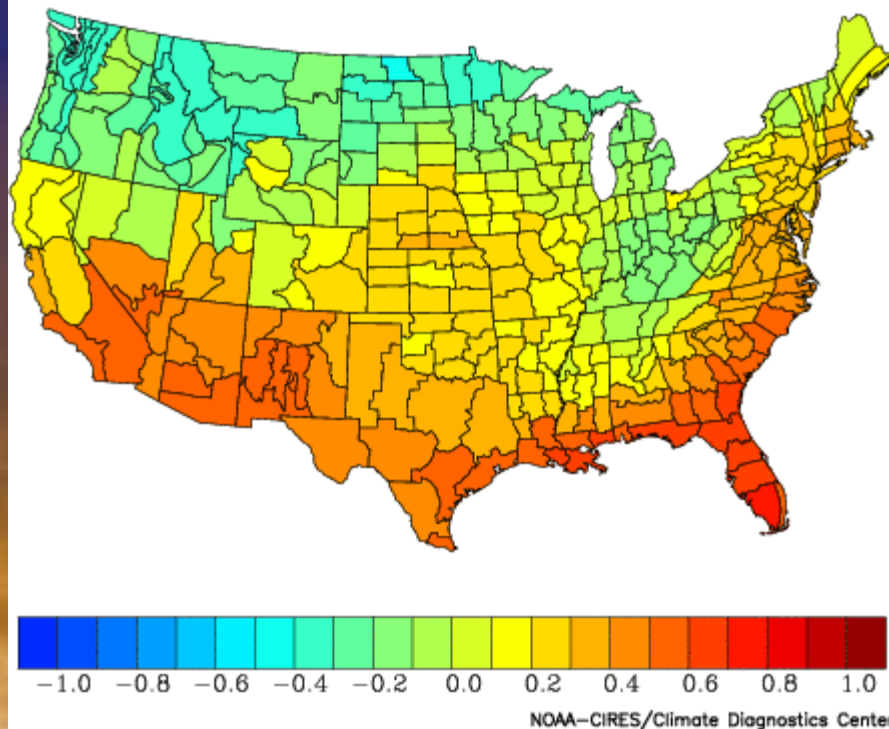




# Correlation to Niño 3.4 SSTs

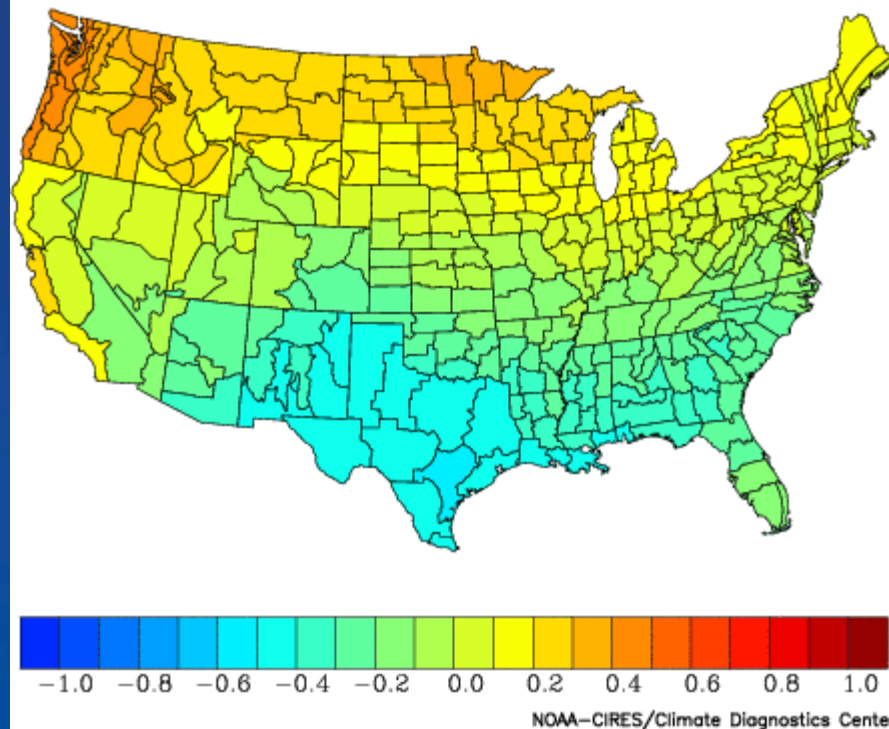
## Precipitation

Correlation Precipitation Nov to Apr  
With Nov to Apr Niño3.4  
1949-06



## Temperature

Correlation Temperature Nov to Apr  
With Nov to Apr Niño3.4  
1949-06

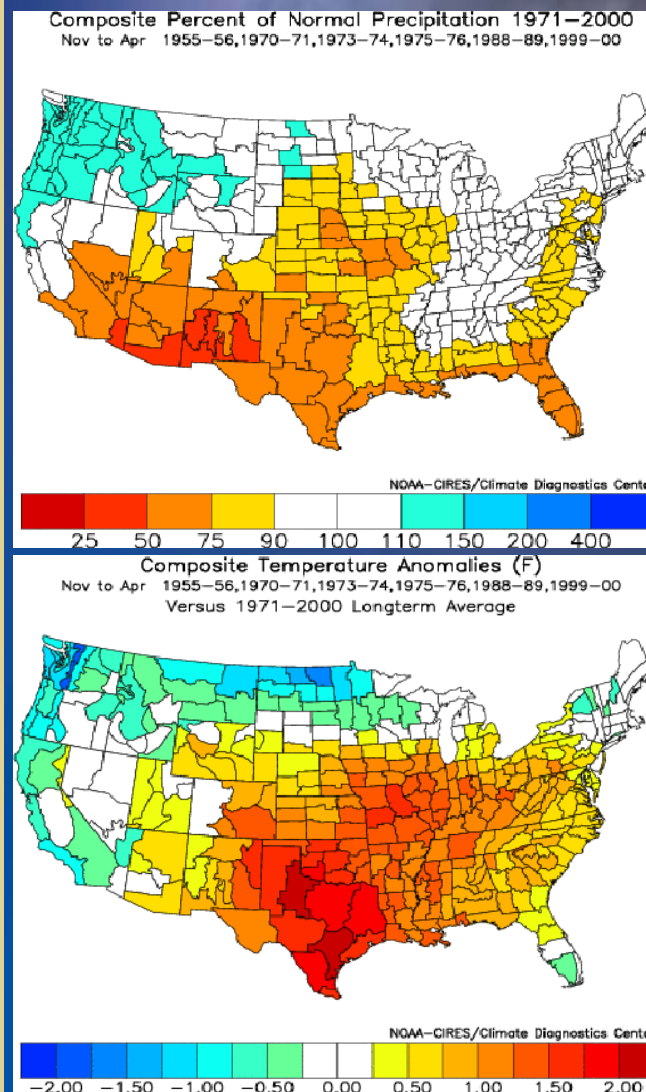
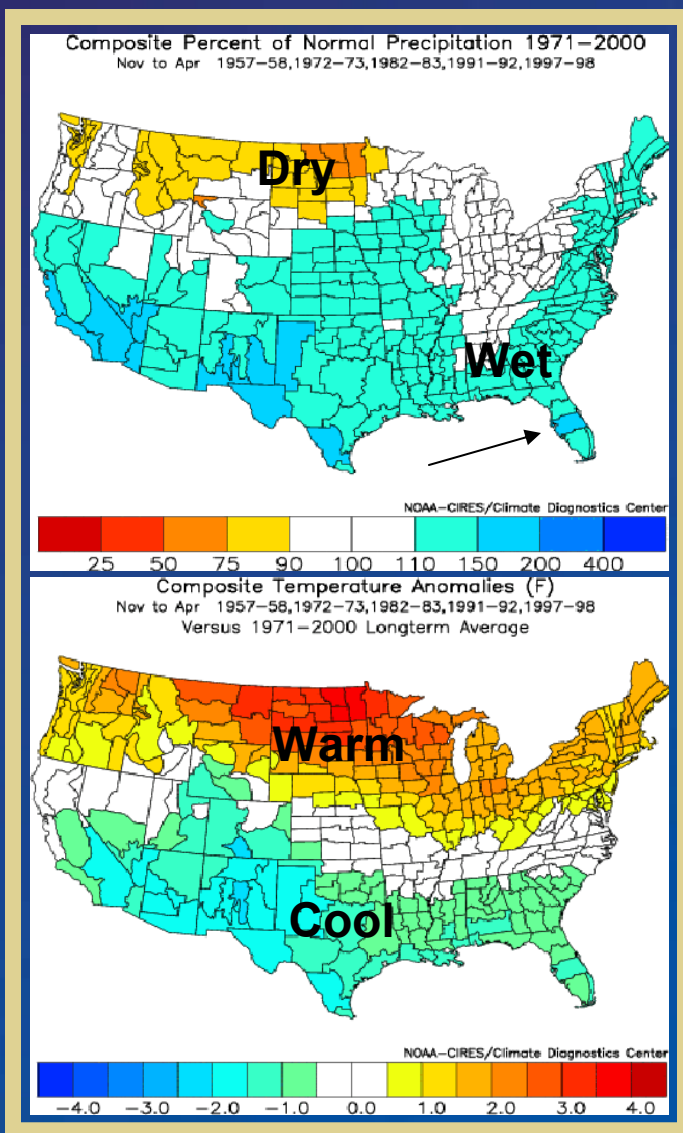


# Analogs - Five Strongest Events

El Niño

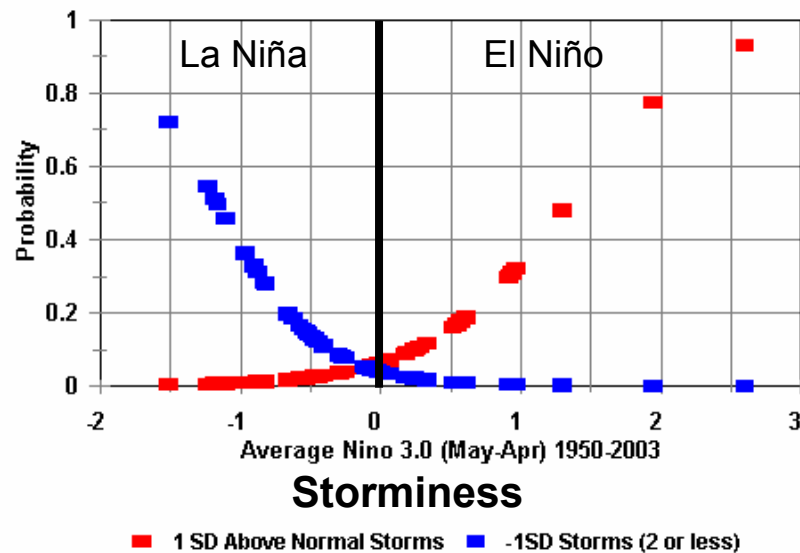
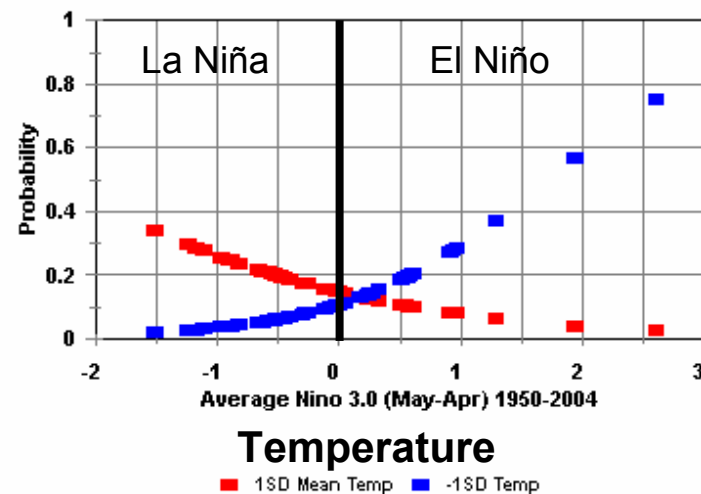
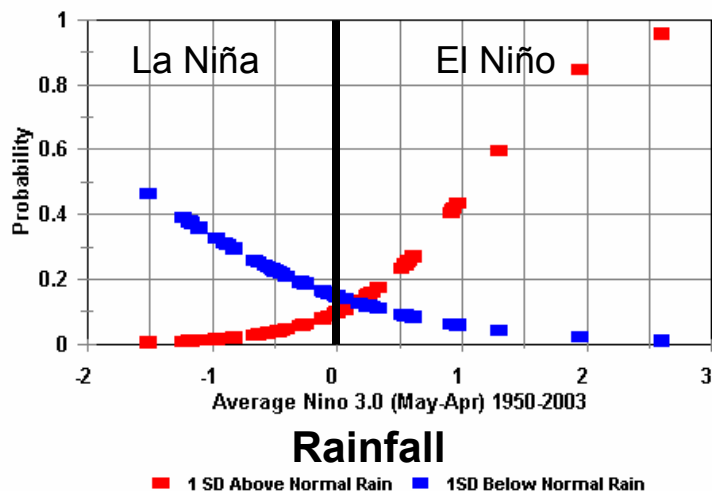
La Niña

Precipitation



Temperature

# Effects Expressed as Probabilities



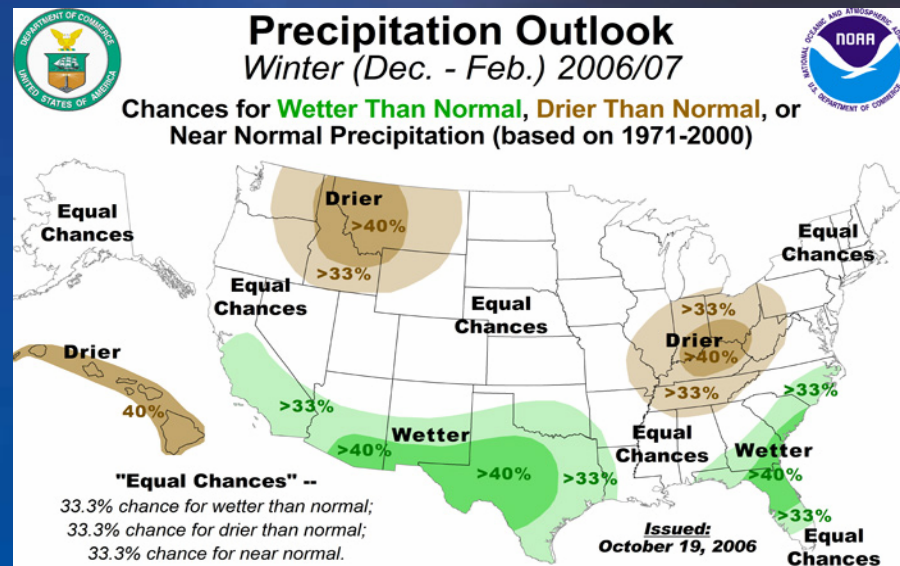




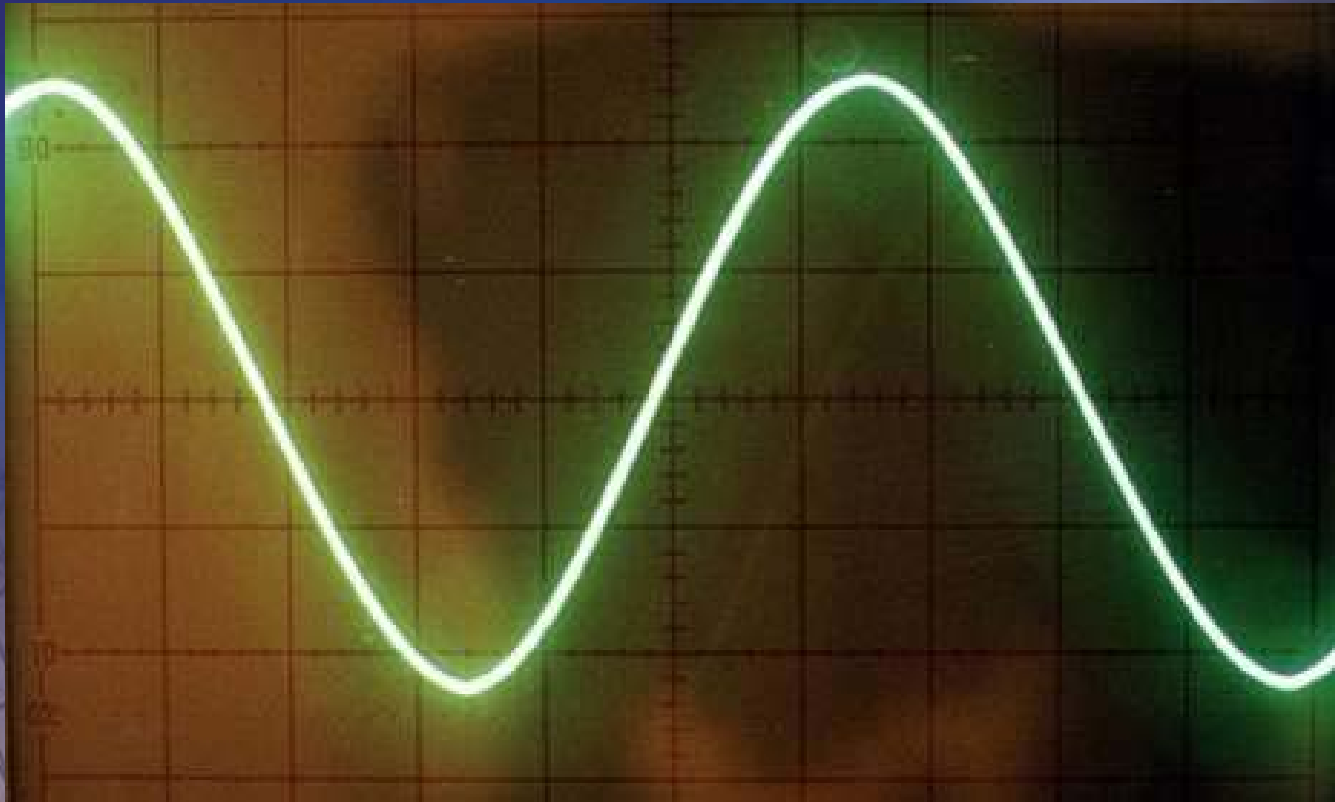
# Dec-Jan-Feb

# Temperature

## Precipitation

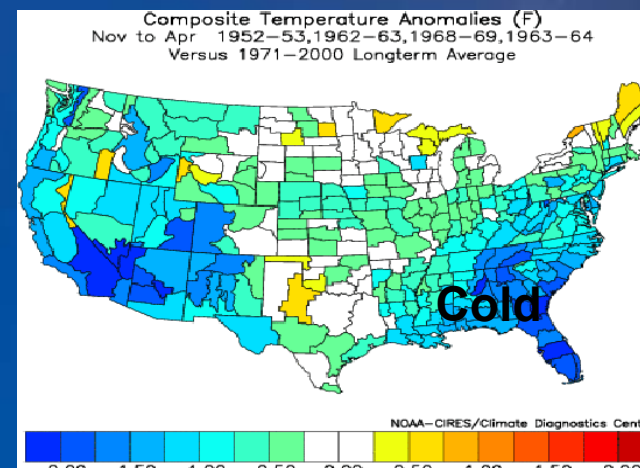
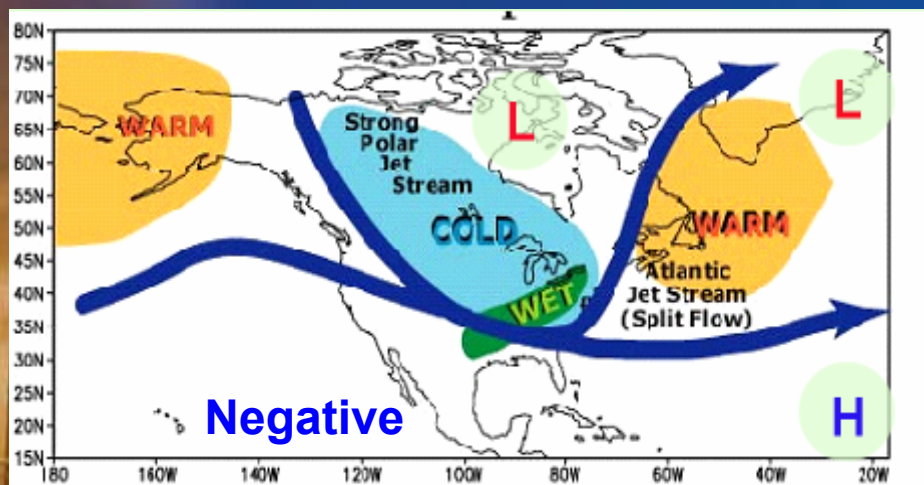
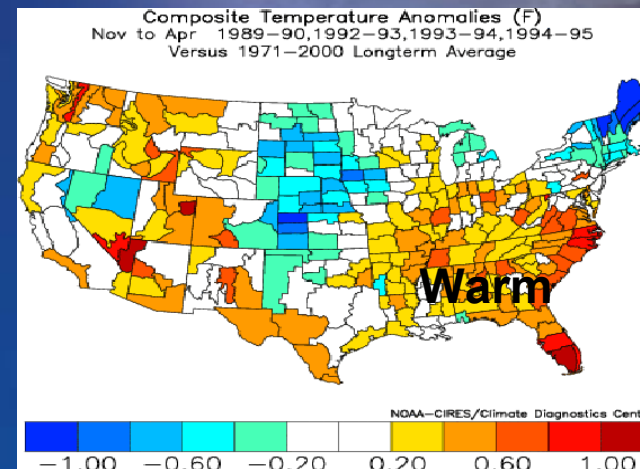
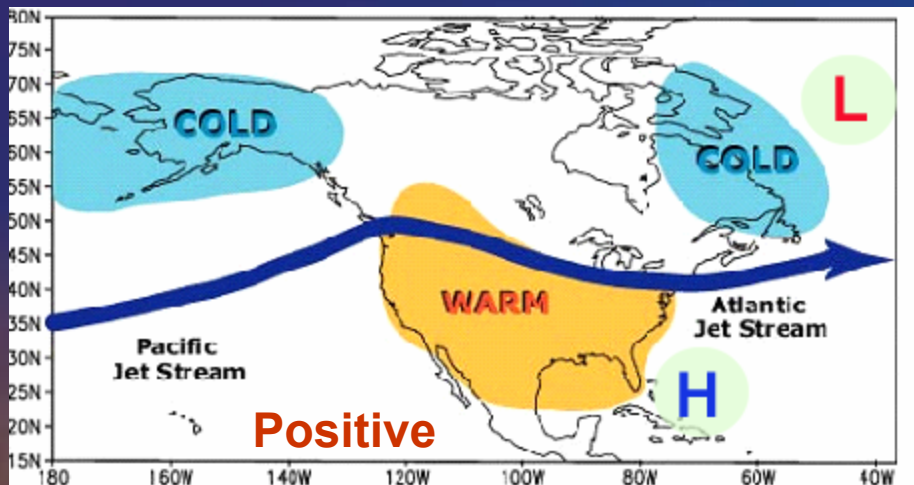


# A Couple of Other Important “Oscillations” You Should be Aware Of



# North Atlantic Oscillation

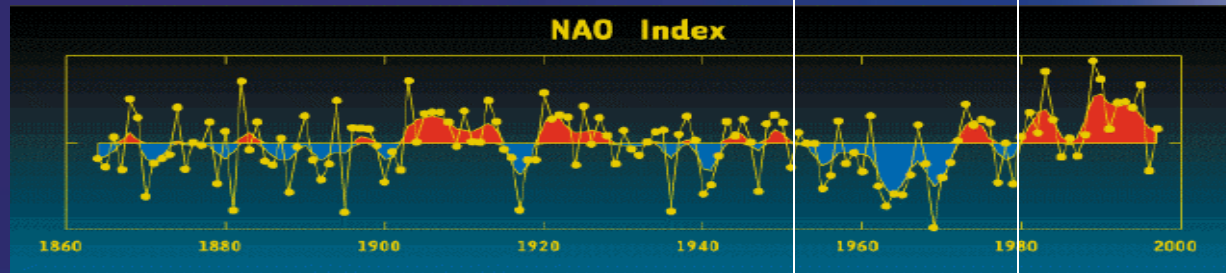
Periodic Fluctuation of Pressure Patterns over the North Atlantic Ocean – Scale of Weeks – Primary Impact on Winter Temperature





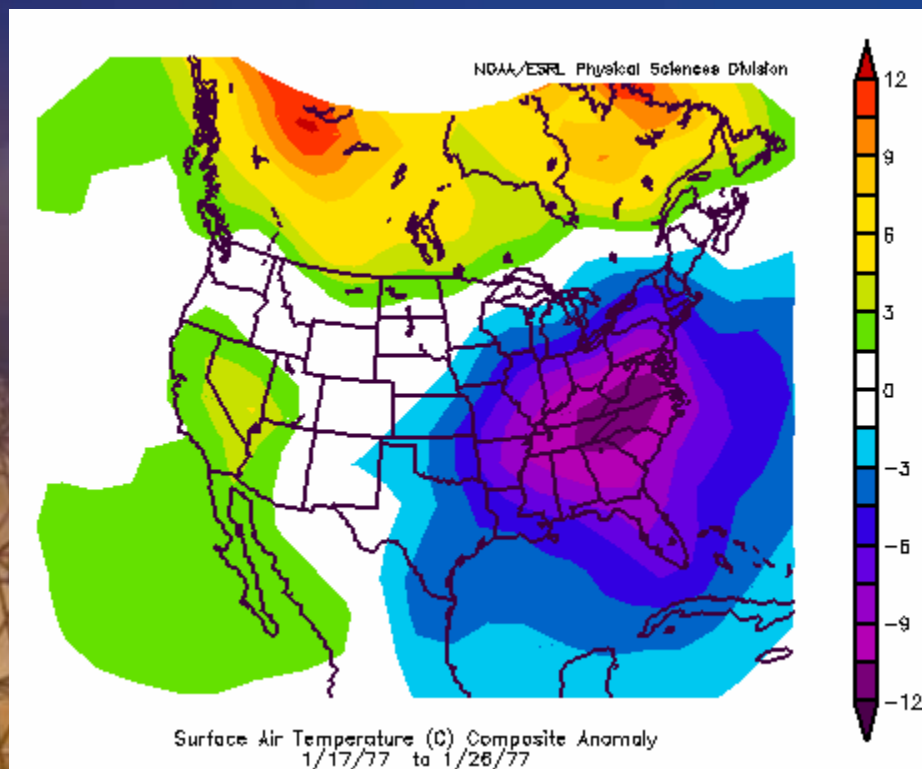
# North Atlantic Oscillation

Devastating Florida Freezes in  
1970s and 1980s



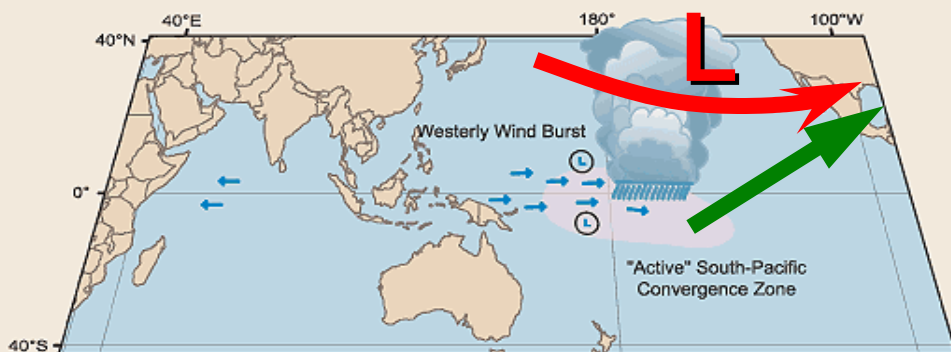
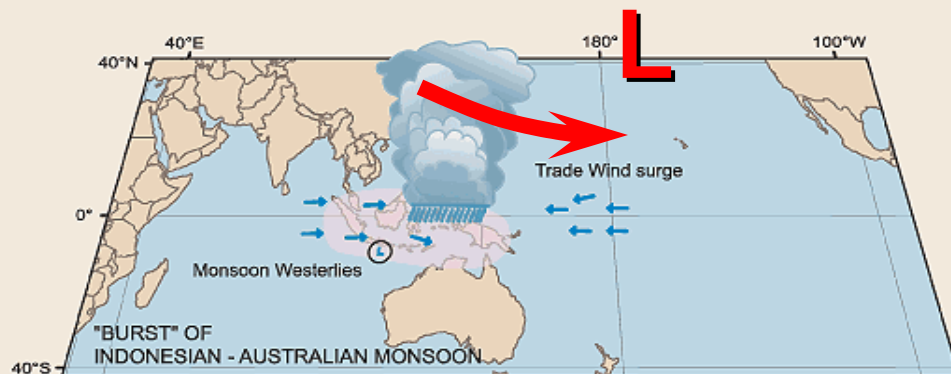
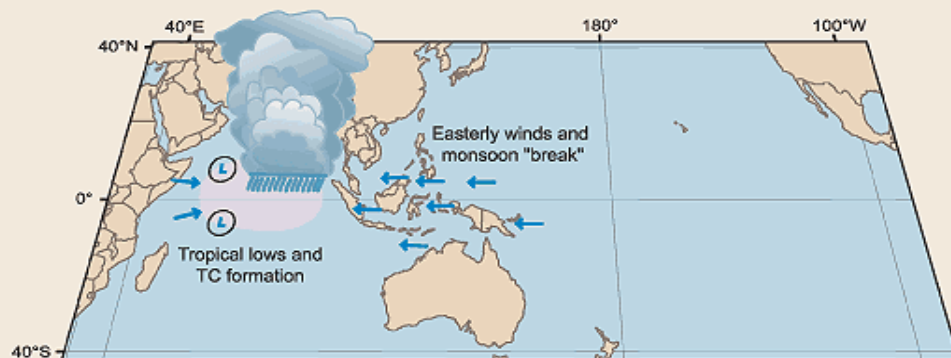
Time, January 1977

Weak El Nino - Strong NAO



# Madden – Julian Oscillation

**Madden - Julian Oscillation**



An equatorial traveling pattern of anomalous convection, rainfall and wind that moves from west to east with a period of 30 to 50 days

Acts to enhance El Niño –  
Can have major impact on winter rainfall!

Approximate 1 Month Sequence

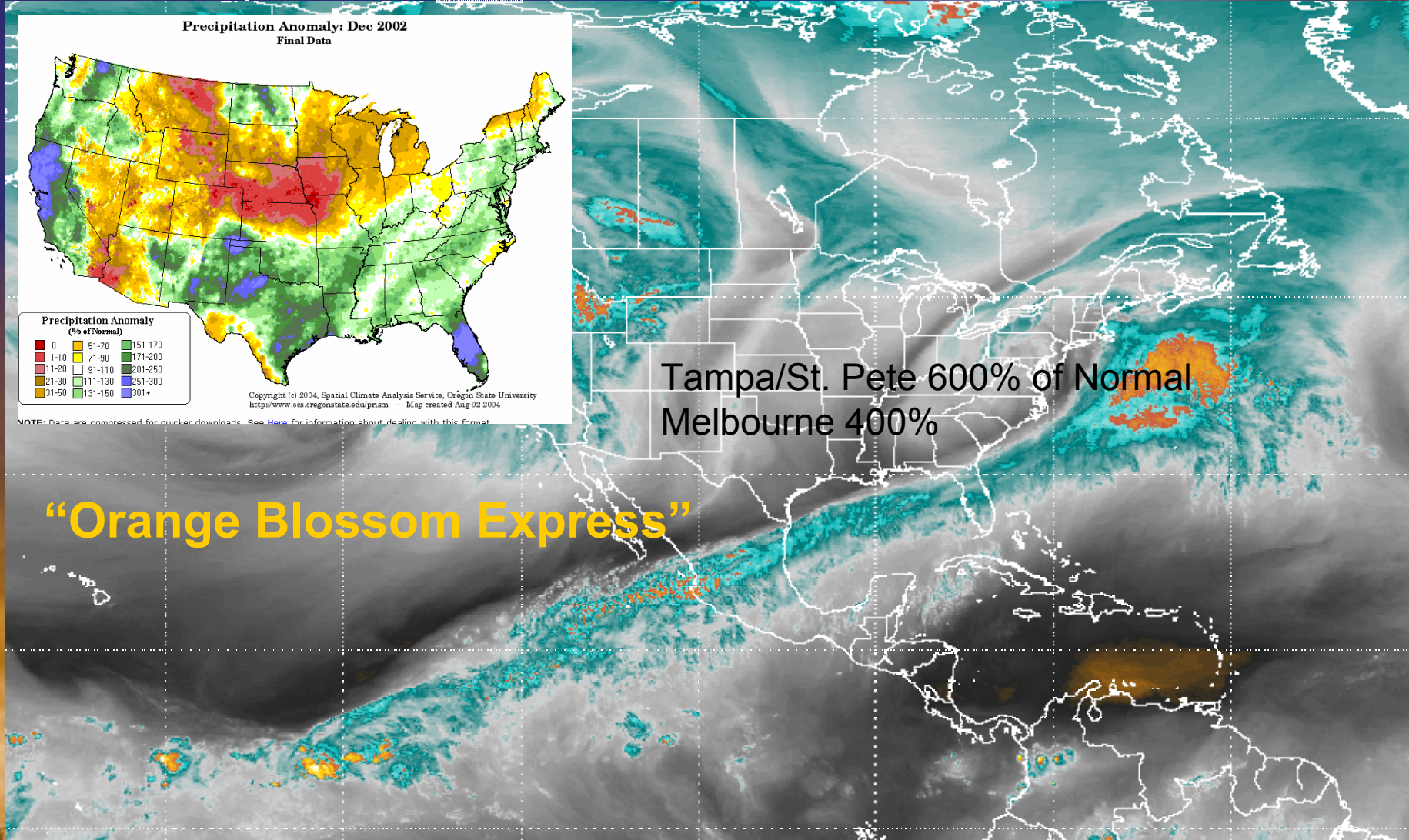


# December 2002

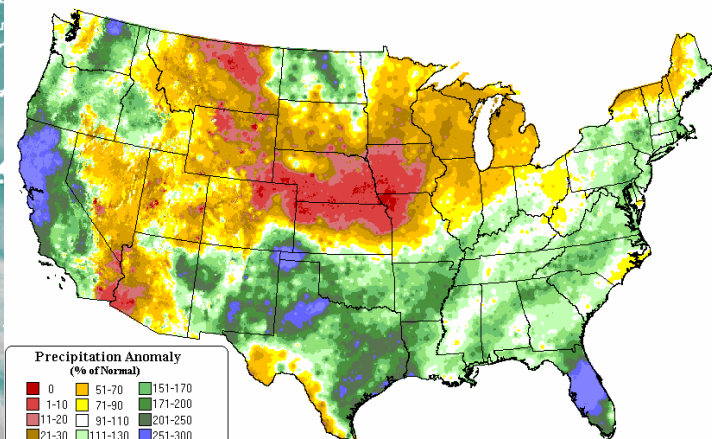
## Weak-Moderate El Niño + MJO = Record Rainfall

14DEC02 1200Z \ R: GOI 14DEC02 1145Z

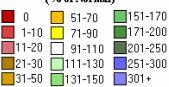
AF WEATHER AGENCY



Precipitation Anomaly: Dec 2002  
Final Data



Precipitation Anomaly  
(% of Normal)



Copyright (c) 2004, Spatial Climate Analysis Service, Oregon State University  
<http://www.osu.edu/pnsm> - Map created Aug 02 2004

NOTE: Data are compressed for quicker downloads. See [Here](#) for information about dealing with this format.

Tampa/St. Pete 600% of Normal  
Melbourne 400%

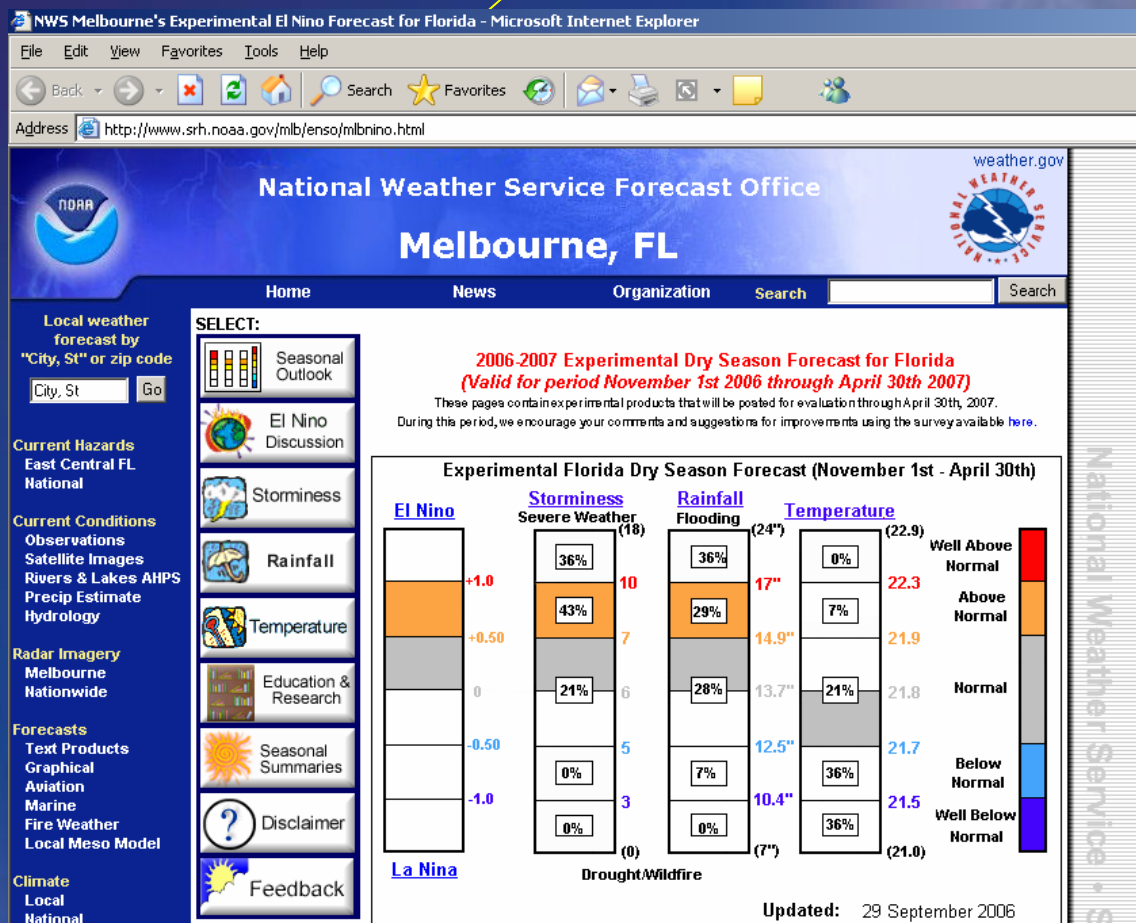
**“Orange Blossom Express”**





# Experimental Dry Season Forecast

[www.srh.noaa.gov/mlb/mlbnino.html](http://www.srh.noaa.gov/mlb/mlbnino.html)



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Planning Tool

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## About this Page

This page is a product of research from the NWS in Melbourne, Florida on the EL Nino-Southern Oscillation (ENSO) and its impact on Florida's dry season. This research, conducted since early 1997, was produced in recognition of the fact that climatic fluctuations on regional and global scales have been shown to have a profound impact on Florida's weather from season to season. The importance of seasonal forecasts continue to increase as Florida's growing population becomes more sensitive to extreme weather events every year. Due to this sensitivity there is a need to better understand seasonal variability and seasonal forecasting of weather-related hazards.



# Hazardous Weather Outlook

National Weather Service Forecast Office - Melbourne

[www.srh.noaa.gov/mlb/ghwo/ghwomain.shtml](http://www.srh.noaa.gov/mlb/ghwo/ghwomain.shtml)

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Address <http://www.srh.noaa.gov/mlb/ghwo/ghwomain.shtml>

## National Weather Service Forecast Office Melbourne, FL

Home News Organization Search

**SKYWARN**  
☐ Activation

**THUNDERSTORM**  
☒ Lightning  
☐ Tornado  
☐ Severe Hail  
☐ Severe Wind

**HEAVY RAIN**  
☐ (Flash) Flood

**SEASONAL**  
☐ Excessive Heat  
☐ Excessive Cold  
☐ High Wind  
☐ Dense Fog / Smoke  
☐ Fire Weather

**COASTAL / MARINE**  
☒ Rip Current  
☐ Coastal Flood  
☐ Waterspout  
☐ Wind and Sea  
☒ Thunderstorm Gust

**RIVER**  
☐ River Flood

**TROPICAL**  
☐ Tropical Cyclone

**Threat Level Scale**  

Extreme
High
Moderate
Low
Very Low
Non-Threatening

### Graphical Hazardous Weather Outlook for east-central Florida

Products issued at: 522 AM EDT WED SEP 27 2006

Tornado

Severe Hail

Severe Wind

HEAVY RAIN

(Flash) Flood

On a scale from 0 to 5, how "threatened" are you by a particular weather hazard? Each day, weather hazards are identified and described by color-coded threat levels according to the Threat Level Scale. You may click on the scale on any page for a general description. To view a particular HAZARD MAP simply click an active hazard from the selector to the left.

Threat Level Scale

522 AM EDT WED SEP 27 2006

THIS HAZARDOUS WEATHER OUTLOOK IS FOR EAST CENTRAL FLORIDA.

.DAY ONE...TODAY AND TONIGHT...

...THUNDERSTORM IMPACT...

LIGHTNING STORMS ARE EXPECTED TO DEVELOP THIS AFTERNOON ALONG AND IN ADVANCE OF A SOUTHWARD MOVING FRONTAL BOUNDARY...ROUGHLY SOUTH OF A LINE FROM SOUTHERN BREVARD COUNTY THROUGH CENTRAL OSCEOLA COUNTY. STORMS WILL PROPAGATE EAST TO NORTHEAST AT 10 TO 15 MPH. THE MAIN THREATS WITH STORMS TODAY WILL BE LOCALLY HEAVY RAINFALL...DANGEROUS CLOUD TO GROUND LIGHTNING AND ISOLATED WIND GUSTS TO 40 MPH.

Threat Awareness

Graphical Forecasts

Related Products

Top of Page | Main HWO Page | Home Page

Day 1 Outlook - Valid through Thu Sep 28 08 AM EDT

Lightning Threat - NWS Melbourne

# Bottom Line

- El Niño favors certain seasonal weather patterns for Florida
  - More Winter/Spring storms – Severe weather
  - Higher rainfall totals
  - Cooler temperatures - but less chance of big freeze
- We haven't had active severe weather season since 2002-03 – Situational Awareness is key!
- Take advantage of beneficial aspects and limit Risk to negative aspects – Educate/Prepare





# Thank You

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[matthew.hirsch@noaa.gov](mailto:matthew.hirsch@noaa.gov)

## Questions?

[www.srh.noaa.gov](http://www.srh.noaa.gov)